



Eagle and the High Level Architecture



Integrated Training Program

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Topics



Integrated Training Program

- **Eagle Design Summary**
- **Summary of Effort & Design**
- **Technical Approach**
- **Class Structures**
- **Interactions**
- **Event Synchronization**
- **RTI Functionality Exercised**
- **Testing - Results**
- **Summary**

**Eagle
has been an active
participant in the
definition and
development of
the HLA.**

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**What is Eagle
anyway ??**



Eagle Design

- Summary -



Integrated Training Program

- **Used by TRAC as a combat development analysis tool to study corps and division level force effectiveness issues. (Not a Training Simulation)**
- **Characteristics**
 - **Corps & below level simulation**
 - **Resolution to Battalion or Company (Entity level w/BDSD)**
 - **Deterministic (Stochastic w/BDSD)**
 - **Hybrid event Structure**
 - **Attrition/Ground Movement/Detection/C2 are Time-stepped**
 - **Air/ADA interactions are Event-driven**
 - **Integrates Artificial Intelligence methods and conventional combat modeling algorithms**
 - **Object-Oriented**
 - **Embedded AI Systems (expert systems)**
 - **Symbolic decision making**
 - **Lisp/KEE Programming environment**
 - **Command and Control modeled explicitly.**
 - **Units execute orders and pass information based on a Battlefield Management language.**



Eagle Design

- Summary -



Integrated Training Program

- **Functional Representation**
 - **Command & Control Headquarters (Corps through Battalion)**
 - **Ground Maneuver Units (Company, Battalion)**
 - **Fire Support Units (Battalion, Battery, Tube, Radar section)**
 - **Air Maneuver Units (Battalion, Company, Section)**
 - **Attack and Scout Helicopter Units**
 - **Air Defense Units (Battalions, Battery, Sections)**
 - **Intelligence (Sections)**
 - **Air & Ground Acquisition Elements (RPV, radar, JSTARS, RECCE)**
 - **Engineers (Battalion, Team)**
 - **Mobility, countermobility, Survivability**
 - **Fixed Wing (Flights)**
 - **CAS, BAI, SEAD**



Eagle Architecture

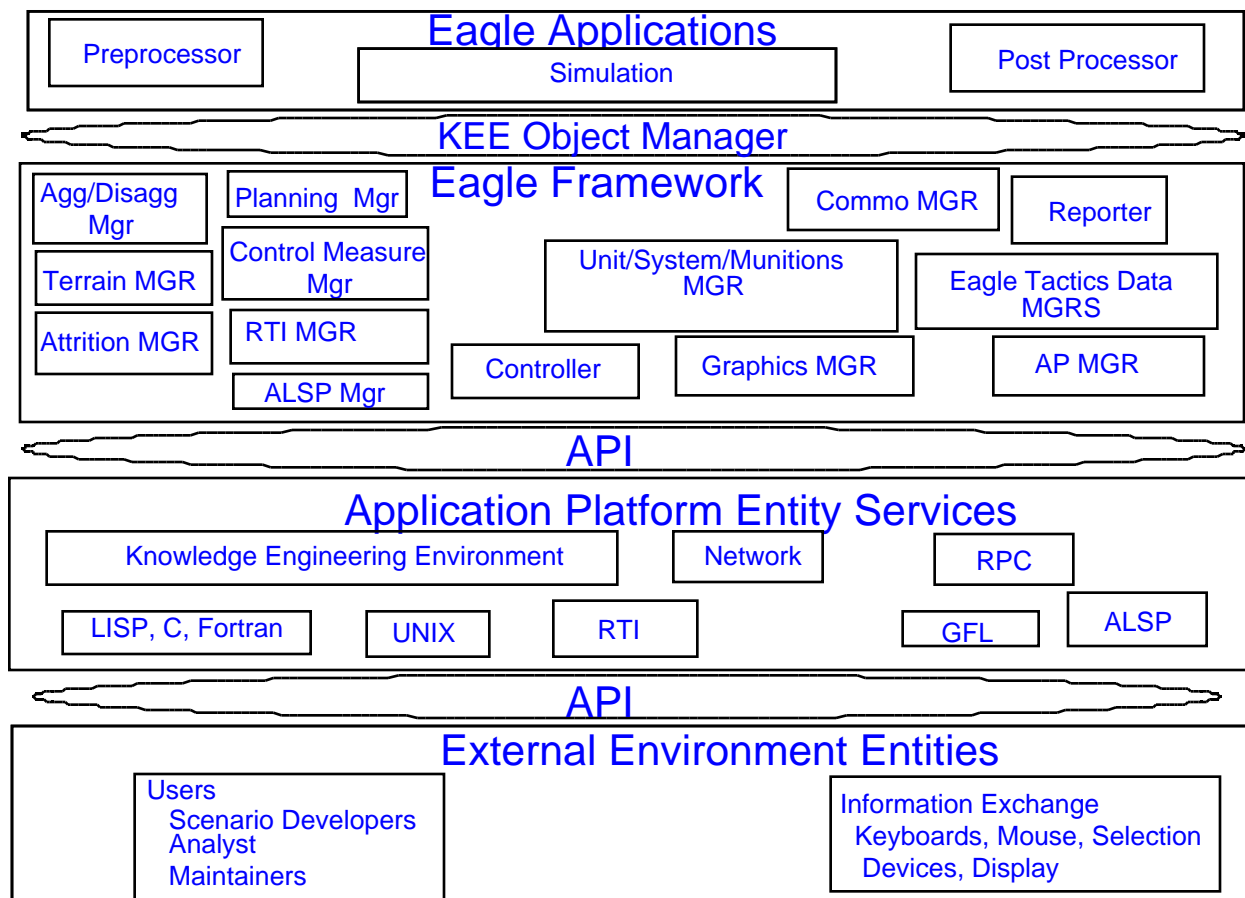


Integrated Training Program

Applications are loaded individually or combined
Simulation = Combat Units

Eagle Framework are services provided to applications.
Responsible for maintaining ground truth.

Runs on HP and Sun workstations.



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**How is Eagle
playing in
this effort??**



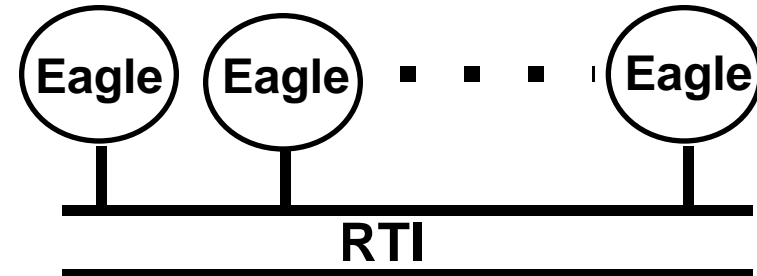
Eagle & the HLA Summary of Effort to Date



Integrated Training Program

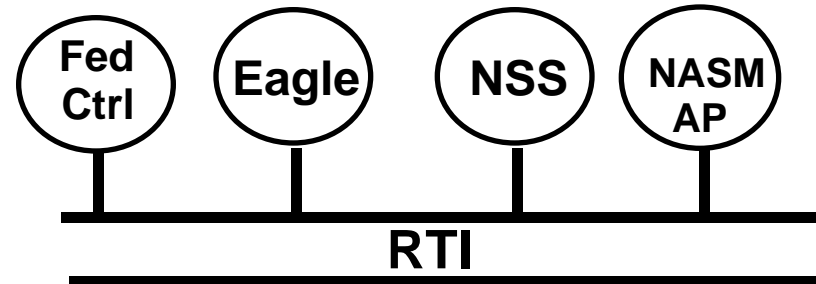
Eagle Early Analysis Experiment

Distributed Units -
Eagle Combat units interact
using the RTI.



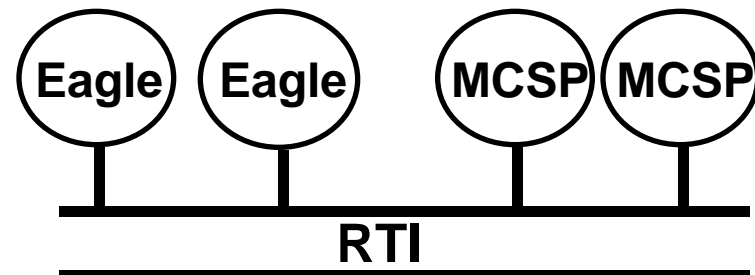
Joint Training Federation (JTFp)

Distributed Functionality-
Army Combat units - Eagle
Navy Combat units - NSS
Air Force Combat units - NASM AP
Federation Controller



Eagle to MCSP/Beta - WarLab

Eagle Combat Hqs divest
Cognitive Processing to
Live Players using MCSP



Design facilitate running as standalone, individual or combined federations



Distributed Eagle Goal & Basic Design



Integrated Training Program

- **GOAL:** Decrease computation load on single processor while minimizing interactions and maintaining the same temporal, tactical, organizational and spacial consistency that currently exists on a single processor.
 - Maintain current validated models.
- **DESIGN:** Combat units are distributed among multiple Eagle simulations on the network.
 - Each simulation maintains its own set of core services
 - Terrain, terrain evaluation, attrition, tactics DB ... etc
 - Each simulation reflects all units not owned by the simulation.
 - The distributed design maintains consistency between:
 - Services on simulations (Terrain conditions).
 - Combat units and their reflected representations.



Functionally Distributed Eagle Goal & Basic Design



Integrated Training Program

- **GOAL:** Allow externally generated Objects (combat or environmental) to interact with Eagle generated combat units while maintaining the same or better temporal, tactical, organizational and spacial consistency that currently exists on a single processor.
- **DESIGN:**
 - Eagle provides all ground combat functionality for the federation. All ground combat units are reflected.
 - Functionality within Eagle is replaced by functionality provided by the confederation members.
 - Eagle replaces normal fixed wing operations by
 - Subscribing to the federation air objects (classes)
 - Publishing & subscribing to interactions between the ground & air players (air to ground / ground to air)



Eagle to MCSP/Beta Goal & Basic Design



Integrated Training Program

- **GOAL:** Allow Live Players, using the MCSP/Beta, to replace the normal command and control activities of a simulated command post.
- **DESIGN:**
 - All physical activities of the command post are played in the simulation.
 - Cognitive activities of the command post are divested to the live players. Two way interactions are allowed
 - All information presented to the live players and their decisions are saved for analysis.
 - The simulated command post maintains a memory of its current state and decisions and can take over from the live players at any time.

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{ Within Eagle and
Between
Eagle & the RTI



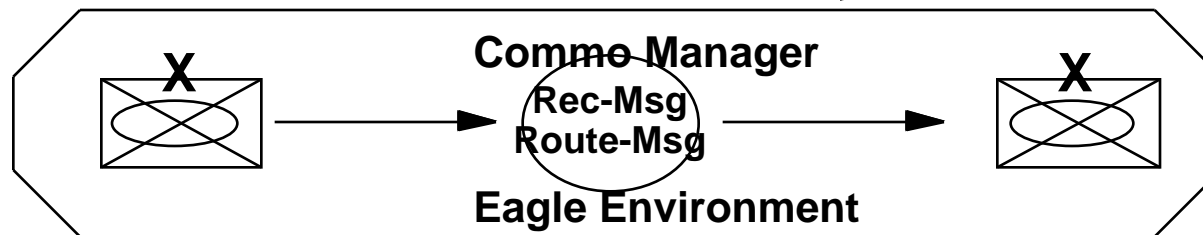
Technical Approach within Eagle (Example)



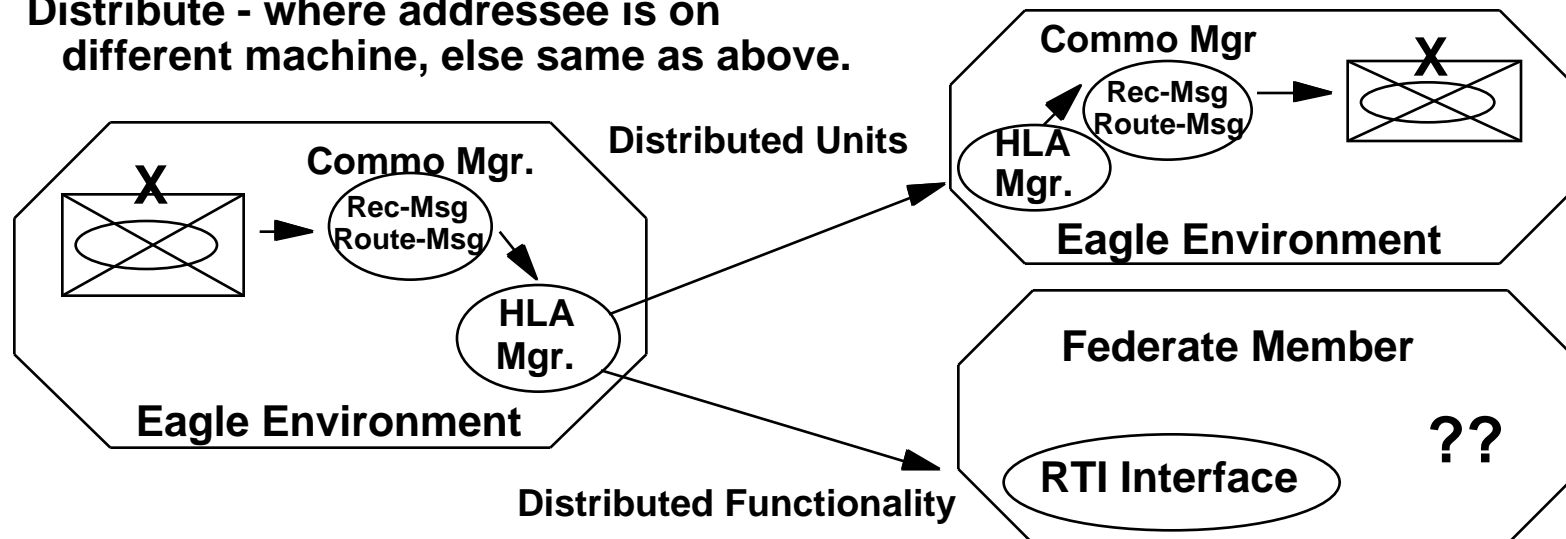
Integrated Training Program

Communications between units.

Stand alone



Distribute - where addressee is on different machine, else same as above.

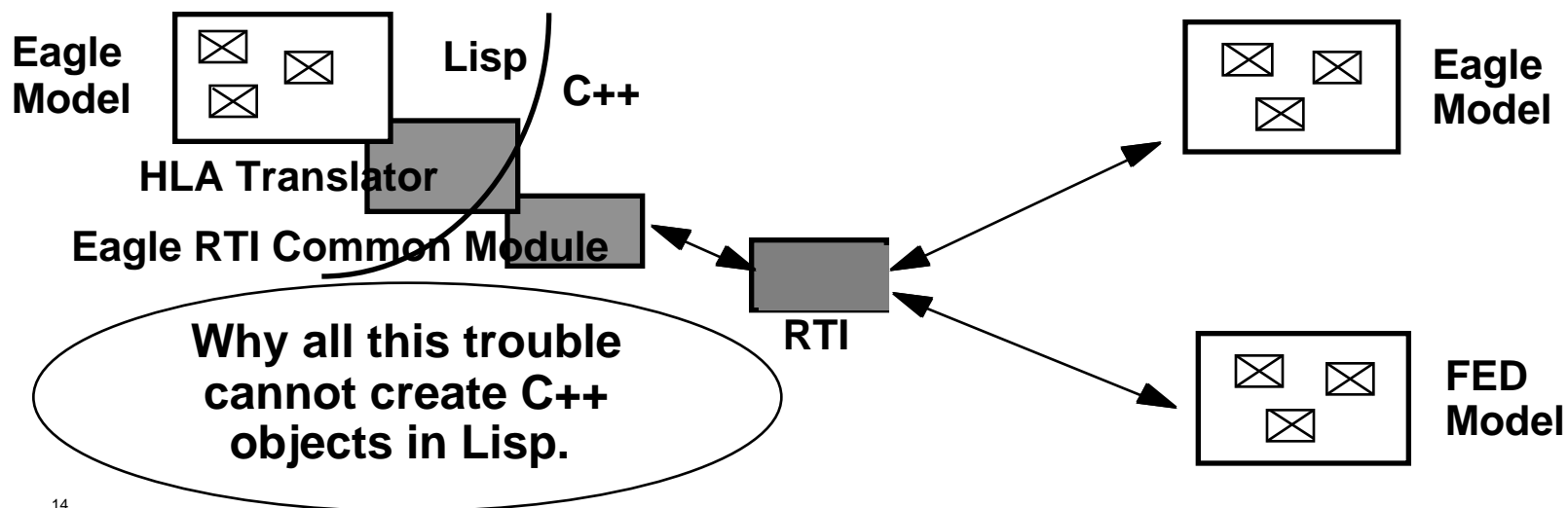


Technical Approach between Eagle & the RTI



Integrated Training Program

- A new Eagle Service (HLA Translator) is provided within the Eagle framework to provide the interface between Eagle objects & the RTI
 - Very little was modified within the actual Eagle code. Most of the work was focused on the translator (11,000 lines of code)
- Each Eagle simulation HLA Translator Service (lisp) communicates with the RTI through an Eagle RTI Common module (C++). (app 4,000 lines of code)
- The Eagle RTI Common module provides the interface with the RTI - (RTI ambassador & Federate Ambassador)



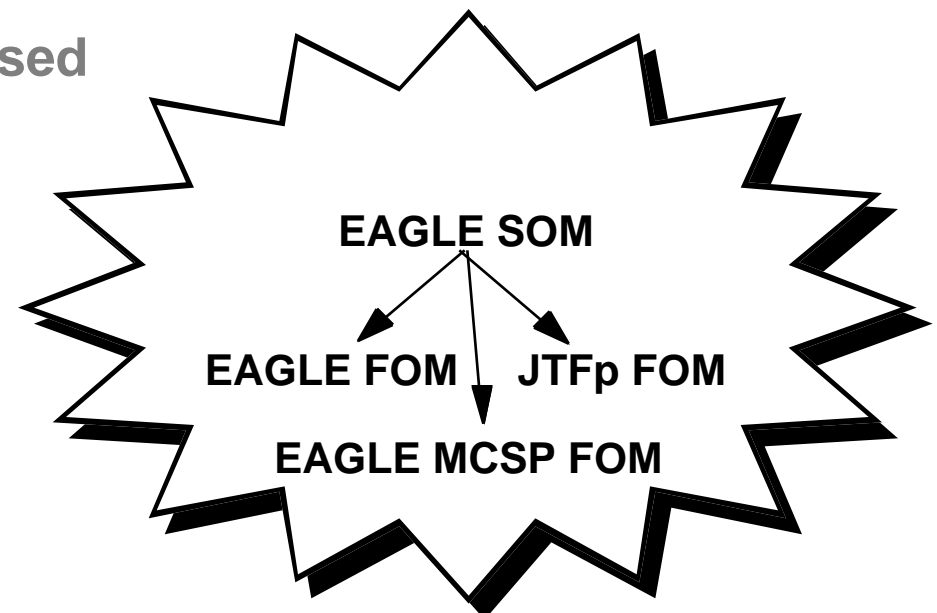
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**{ Software Object Model
and
Federate Object Model**





Eagle Class Structure

Normal structure in model (one example)



Integrated Training Program

A bottom level class.

Instances would be created and attached to this class

The instances would inherit from all the objects to the right

BLUE-BDE-CP	STAFF	LOG-MANAGER		
		LOG-ISSUER		
		HQ-UNITS	GROUND-MOVERS	ADA-FIRERS
				ARMY-UNITS
				MILITARY-UNITS
				LOG-RECEIVER
				PURGE-UNITS
	SIGNATURE-GROUND-MOVERS	SIGNATURE		
	RES-BATTLE-OPERATIONS-GROUND-MOVERS	RES-BATTLE-OPERATIONS-MILITARY-UNITS	RES-BATTLE-OPERATIONS	
	DIRECT-FIRE-INFO-MILITARY-UNITS	DIRECT-FIRE-INFO		
	ENGR-INFO-MILITARY-UNITS	ENGR-INFO		
	RES-EFFECTIVENESS-MILITARY-UNITS	RES-EFFECTIVENESS		
	AD-INFO-HQ-UNITS	AD-INFO-MILITARY-UNITS	AD-INFO	
	CMD-PLANNING-HQ-UNITS	CMD-PLANNING		
	COMMO-HQ-UNITS	COMMO-GROUND-MOVERS	COMMO-MILITARY-UNITS	COMMO
	CP-BATTLE-OPERATIONS-HQ-UNITS	CP-BATTLE-OPERATIONS		
	CP-DECISION-FACTORS-HQ-UNITS	CP-DECISION-FACTORS		
	CP-EFFECTIVENESS-HQ-UNITS	CP-EFFECTIVENESS		
	GENERAL-HQ-UNITS	GENERAL-MILITARY-UNITS	GENERAL	
	INDIRECT-FIRE-INFO-HQ-UNITS	INDIRECT-FIRE-INFO-MILITARY-UNITS	INDIRECT-FIRE-INFO	
	INTEL-HQ-UNITS	INTEL-MILITARY-UNITS	INTEL	
	MEMORY-HQ-UNITS	MEMORY-GROUND-MOVERS	MEMORY-MILITARY-UNITS	MEMORY
	METHOD-MAPS-HQ-UNITS	METHOD-MAPS-GROUND-MOVERS	METHOD-MAPS-MILITARY-UNITS	METHOD-MAPS
	MOVEMENT-HQ-UNITS	MOVEMENT-GROUND-MOVERS	MOVEMENT-MILITARY-UNITS	MOVEMENT
	PERCEPTIONS-HQ-UNITS	PERCEPTIONS-MILITARY-UNITS	PERCEPTIONS	
	RES-DECISION-FACTORS-HQ-UNITS	RES-DECISION-FACTORS-GROUND-MOVERS	RES-DECISION-FACTORS-MILITARY-UNITS	
			RES-DECISION-FACTORS-ARMY-UNITS	
	SUPPLY/PERSONNEL-LOG-MANAGER	SUPPLY/PERSONNEL		

This entire Class structure feeds into the bottom level Class (BLUE-BDE-CP)



Eagle Class Structure

← Eagle SOM ←
Distributed Eagle FOM & JTFp FOM



Integrated Training Program

Distributed Eagle FOM (partial)

Base Class	1st SubClass	2nd SubClass
Military Units	Ground Movers	
	Air Movers	Air Maneuver
		Fixed Wing

JTFp FOM (partial)

Base Class	1st SubClass	2nd SubClass
Player	Air Player	Ballistic Missile
		Aircraft
		Flight
	Ground Player	Fixed Site
		Mobile Ground
		Aggregate Ground
	Float Player	

Eagle SOM Class Structure (partial)

Eagle SOM - Partial Class Structure				
MILITARY UNITS	AIR-MOVERS	FIXED-WING-UNITS	AIR-SENSOR-UNITS	BLUE-AIR-SENSOR-FLIGHT
				RED-AIR-SENSOR-FLIGHT
			FIXED-WING-ATTACKERS	BLUE-FLIGHT
				RED-FLIGHT
		HELICOPTER-UNITS	BLUE-HELO-BN	
			BLUE-HELO-CO	
			RED-HELO-BN	
			RED-HELO-CO	
			BLUE-AD-UNIT	
			RED-AD-UNIT	
			B-CBT-ENGR-TM	
			B-CBT-HVY-ENGR-TM	
			R-CBT-ENGR-TM	
			R-GP-ENGR-TM	
		ARTILLERY-UNITS	BLUE-ARTY-BN	
			BLUE-ARTY-BATTERY	
			RED-ARTY-BN	
			RED-ARTY-BATTERY	
		GROUND-SENSOR-UNITS	BLUE-GROUND-SENSOR-UNIT	
			RED-GROUND-SENSOR-UNIT	
		GROUND-MANEUVER-UNITS	BLUE-BN-TF	
			RED-MRR-BN	
			RED-TANK-BN	
			BLUE-CO	
			RED-CO	
			BLUE-CORPS-CP	
			BLUE-DIV-CP	
			RED-ARMY-CP	
			RED-DIV-CP	
			BLUE-BDE-CP	
			BLUE-BN-CP	
			BLUE-ENGINEER-CP	
			RED-REGT-CP	
			RED-BN-CP	
			RED-ENGINEER-CP	



Class Structure Attributes Used to Define Reflected Units



Integrated Training Program

Distributed Eagle FOM (Partial - Ground Mover)

OBJECT	ATTRIBUTE
MILITARY- UNITS	Battlefield Operating System
	Higher Hdq's name
	Depth of unit (meters)
	Direction of movement of the unit
	Disaggregated boolean
	Echelon
	Percent Effective
	Effectiveness State
	Frontage of Unit (meters)
	Latitude
	Longitude
	Name
	Operational Activity
	Orientation of weapons
	Phantom boolean
	Purged boolean
	Quantity of Sytems on-hand by type
	Route segment
	Side
	Size
GROUND- MOVERS	Systems requirements code
	System configuration
	Task
	Unit Type
	Air Defense Controller
	Air Defense Network boolean
	Air Defense Status
	Assignment
	Command Assignment
	Command Unit boolean
	Indirect Fire Systems on-hand
	Number of Indirect Fire Units
	Prioritized Enemy List
	Signature - counter battery
	Signature - counter mortar
	Signature - combat
	Signature - communications
	Previously detected boolean
	Signature - IR
	Signature - Moving Target Radar
	Signature - photo
	Net speed from last time step
	System weight factor

JTFp FOM (Partial - Aggregate Ground Player)

OBJECT	ATTRIBUTE
Player	entity name
	federate id
	affiliation
	motion type
	voice nets
	jüds nets
	trap tre
	comander type
	radar cross section
	radar detectable
Aggregate Entity	elint detectable
	comint detectable
	ir detectable
	photoint detectable
	air to air engageable
	surf to air engageable
	air to surf engageable
	surf to surf engageable
	composition
	time at last cse change
Dead Reckoned Players	lat at last cse change
	lng at last cse change
	alt at last cse change
	cse at last cse change
	hspd at last cse change
	vspd at last cse change
Aggregate Ground Player	depth
	front
	orientation

Number of Attributes to define
a typical ground combat unit in
Eagle: ~ 400

Number of Attributes to reflect
units in Distributed Eagle:

	Define	Update
Ground Movers	43	31
Air Maneuver	35	26
Fixed Wing	33	22

Number of Attributes to reflect
Aggregate Ground Units in JTFp:

	Define	Update
Ground Movers	29	17

Attributes used for
detection's



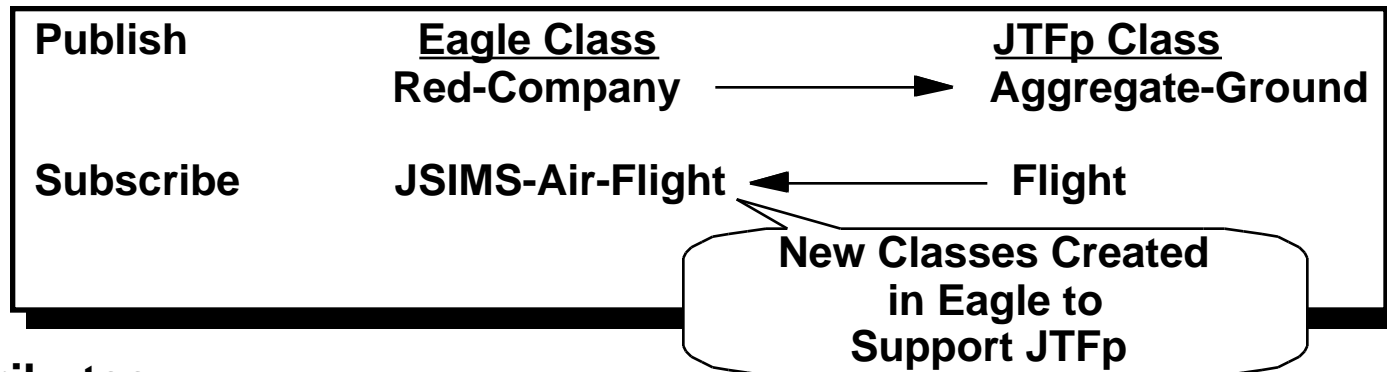
Eagle Modifications to Support the JTFp Object Class & Attributes



Integrated Training Program

- Translate the Eagle combat units & attributes to conform to the JTFp FOM and JTFp units & attributes to Eagle.

- Class structure:



- Attributes:

	<u>Eagle</u>	↔	<u>JTFp</u>
Attribute Names:	a-side		affiliation
Enumerated types:	M1		5
Data Translation:	xy (1)		Lat & Lon (2)
New Attributes:	<N/A>		Motion Type
Methodology:	Time Step Location		Dead Reckoning
Data Types	Lisp Symbol		Float etc.

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Distributed Eagle
Shooting
Communications
Data Base Consistency
DIS interactions
Surrogate C4I

Eagle MCSP Beta
Simulation Management
Communications

JTFp
Federation Management
Shooting
Communications
Environmental



Distributed Eagle Interaction Structure

Typical Interactions Between Combat Units and Services



Integrated Training Program

- **Unit Interactions**

- Detection (implicit)
- Direct Fire
- Indirect Fire
- Air to ground
- Ground to air
- Communications

- **Service Interactions**

- Event Queue Management
 - Add/remove events
- Control Measures Database consistency
 - Create CM
- Terrain Database consistency
 - False targets
 - Register engr work
- Attrition
 - Ammo use
 - Suppression

**Command & Control
between units is
established by the Plan.
All reporting and directing
go through Commo channels.**



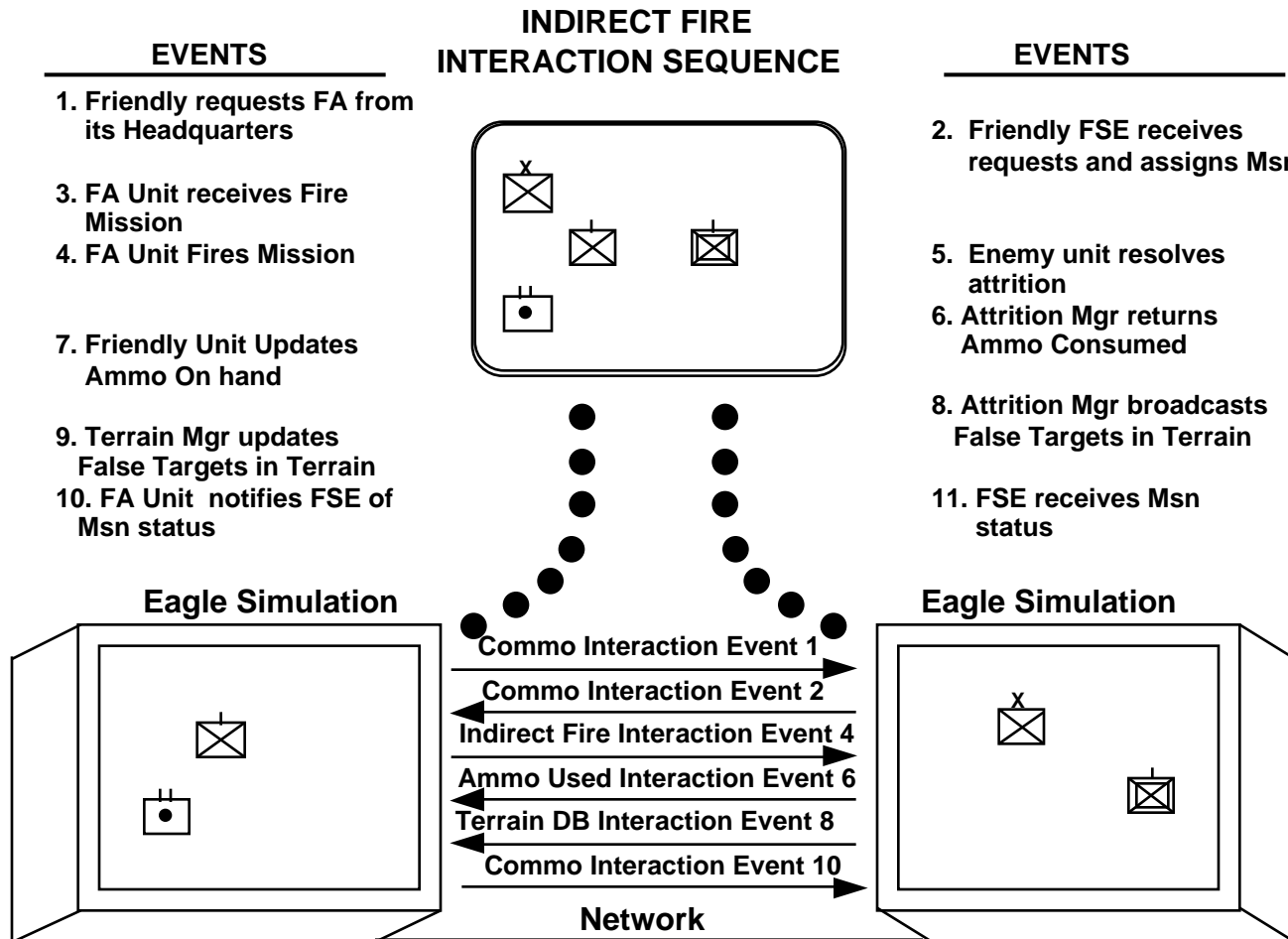
Eagle Interactions

C2 ... Indirect Fire

Example Interactions in distributed Eagle



Integrated Training Program





Current Interactions Allowed

Distributed Eagle

23 interaction types - total with subtypes: 65



Integrated Training Program

Interaction	Initiating Class	Receiving Class
Engagement direct fire ground to ground	Attrition Manager	Attrition Manager
Bulk ammunition consumed	Attrition Manager	Ground-Movers, Air Movers
Engagement indirect fire ground to ground	Attrition Manager	Attrition Manager
Suppression update	Attrition Manager	Ground-Movers
Engagement Air to Ground	Attrition Manager	Ground-Movers
Aircraft abort flight notification.	Fixwing	Airspace manager
New air/ada events for Time Step.	Air Space Manager	Air Space Manager
Communications between units	Commo Manager	Commo Manager
Create control measure - db_consistency	Scenario Control Measures Manager	Scenario Control Measures Manager
Dead Target Updates - db_consistency	Attrition Manager	Terrain Manager
Register Eng. Work - db_consistency	Terrain Manager	Terrain Manager
Update Terrain Feature - db_consistency	Terrain Manager	Terrain Manager
Remove Terrain Feature - db_consistency	Terrain Manager	Terrain Manager
Ground receive losses air attack.	Attrition manager	Ground Movers
Activate IDF msn	Military Unit (Command)	Attrition Manager
Update tf occupancy - db_consistency	Terrain Manager	Terrain Manager
Update-active-aois	Ground-Mover	Air-Maneuver
Create-breach - db_consistency	Terrain Manager	Terrain Manager
Create-bypass - db_consistency	Terrain Manager	Terrain Manager
Set Unit visibility terrain- db_consistency	Military-units	Terrain Manager
Set Unit visibility map- db_consistency	Military-units	Terrain Manager
Set unit visible - db_consistency	Military-units	Military-units
Db-consistency, used to coordinate events	Aggregate actors	Aggregate actors
Eagle Management - stop, start ...	Eagle Controller, Confederation Manager	Eagle Controller, Confederation Manager
SIU - Dis interactions between actors	Model Network Manager	Model Network Manager
Resolution Unit Interface - C4I interactions	C4I Interface, Military Unit	C4I Interface, Military Unit
CommandUnit Interface - C4I interactions	C4I Interface, Military Unit	C4I Interface, Military Unit

JTFp Interactions that Involve Eagle



Integrated Training Program

- **Unit Interactions**
 - Detection (implicit)
 - Indirect Fire
 - Air to surface
 - Surface to air
 - Communications
- **Federation Management Interactions**
 - Initialization
- **Environmental**
 - LOS

Interaction	Initiating	Receiving
TBM Warming	Player	Eagle Commo Manager - Player
TBMLaunchAlert	Player	Eagle Commo Manager- Player
Situation Report	Player - Eagle Commo Manager	Player (JTF HQ)
RequestAirSupport	Player - Eagle Commo Manager	Player (JTF HQ)
AirToAggregate GroundEngage	Player	Eagle Attrition Manager
DiscreteGroundToAirEngage	Player	Eagle Attrition Manager
AggregateGround ToAirEngage	Eagle Attrition Manager	Player
Get & Return LOS	Eagle Terrain Manager	Surface Cover
Initialize Federation	Federation Status	Eagle Federation Status
Execute Federation	Federation Status	Eagle Federation Status

**JTFp has defined 24 Interactions
Eagle subscribes/published to 10**

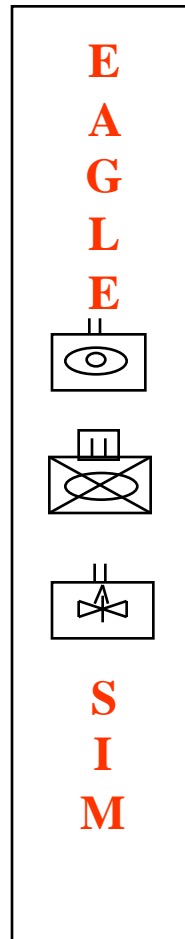


EAGLE To MCSP Interactions

10 defined (9 to MCSP, 1 to Eagle)

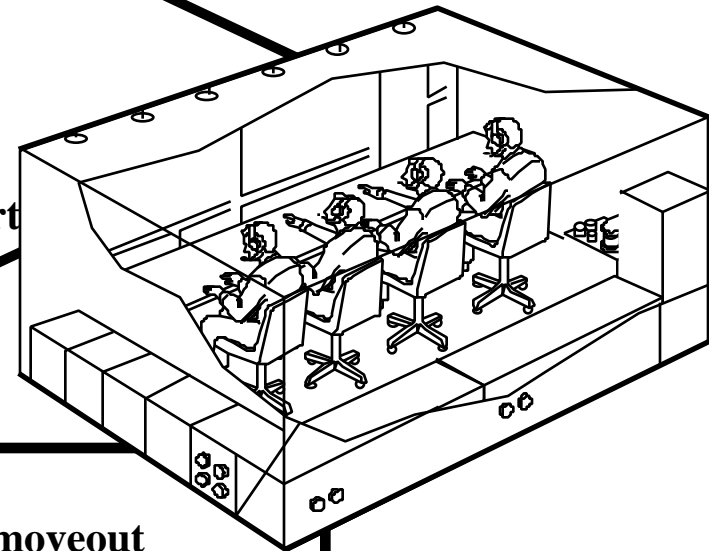


Integrated Training Program



Situation/Status Report
Enemy Report
Message Report
Logistics Report
Field Artillery Status Report
Field Artillery Fire Mission Report
Field Artillery Fire Mission Complete Report
Sensor report

Request status
Order changetask, halt, moveout
Frag order - (who, what, when, where)
Execute frag order
Fire mission
(Controller directives: run, pause, speed)





Eagle Modifications to Support the JTFp Interactions and Parameters



Integrated Training Program

- Translate the Eagle interactions & parameters to conform to the JTFp FOM and JTFp interactions & parameters to Eagle.

- Interactions:

Publish	<u>Eagle</u> engage-ground-to-air	→	<u>JTFp</u> AggregegateGroundtoAir
Subscribe	commo	←	TBM Warning
	engage-air-to-ground	←	AirtoAggregateGround

- Parameters:


	<u>Eagle</u>	↔	<u>JTFp</u>
Parameter Names:	a-system		weapon_system
Enumerated types:	M1		5
Data Translation:	xy (1)		Lat & Lon (2)
New Attributes:	<N/A>		Launch_quad
Data Types	Lisp Symbol		Float etc.
Data Format	Complex Type		Separate Parameters

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**Time Management
is your friend
not your enemy!**

The Challenge



Integrated Training Program

To maintain a consistent view of time within Eagle regardless of the types of simulations that are participating in a federation.

Simulations that use RTI Time Mgt

- 1. Use time steps to advance time
timesteps = Eagles (Eagle)**
- 2. Use events to advance time (NSS,NASM)**

Coordinated

**Running as fast as possible
or scaled real time**

paced - yes/no

**Simulations that do not
use RTI Time Mgt (DIS)**

Independent

Real time

paced - yes

Eagle has a hybrid event structure that relies on both the notion of continuous time using time steps (1 to 5 mins) and the projecting of discrete events limited to the duration of the time step.

Additional Challenges



Integrated Training Program

1. Eagle can not have unique time management scheme for each Fed.
2. Eagle must maintain causality with DIS. Processing time must be considered in updates.
3. Eagle must maintain consistency between its internal time step events which all occur at the same time.
4. Eagle must constraint time advance to RTI.
5. Eagle must be able to advance to a time short of requested (external events).

Tools provided by RTI that Eagle uses to maintain time & consistency:

TIME_ADVANCE_REQUEST

TIME_ADVANCE_GRANT

NEXT_EVENT_REQUEST

SET_LOOKAHEAD

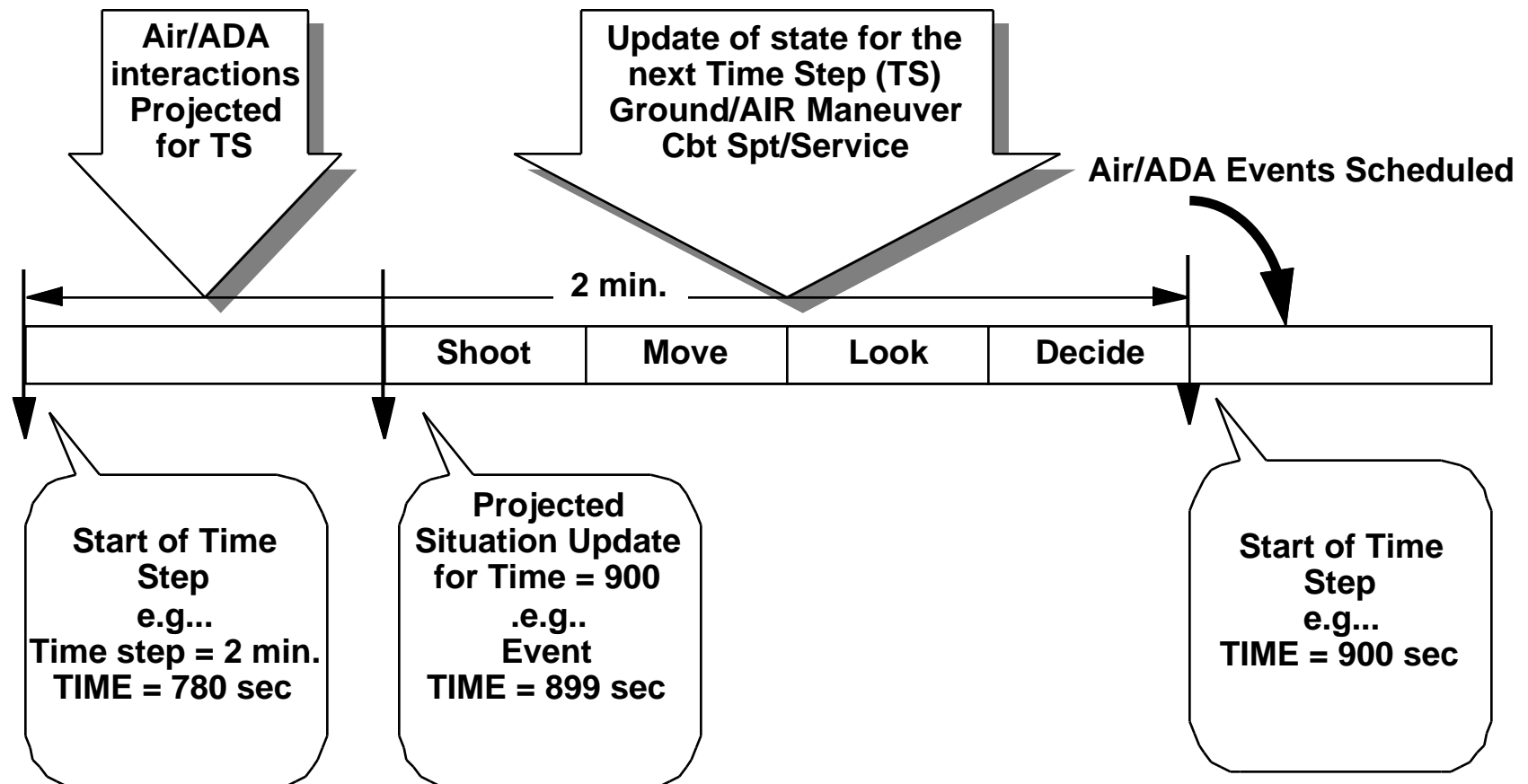


EAGLE Time Management

Hybrid Structure - Time step & Event



Integrated Training Program



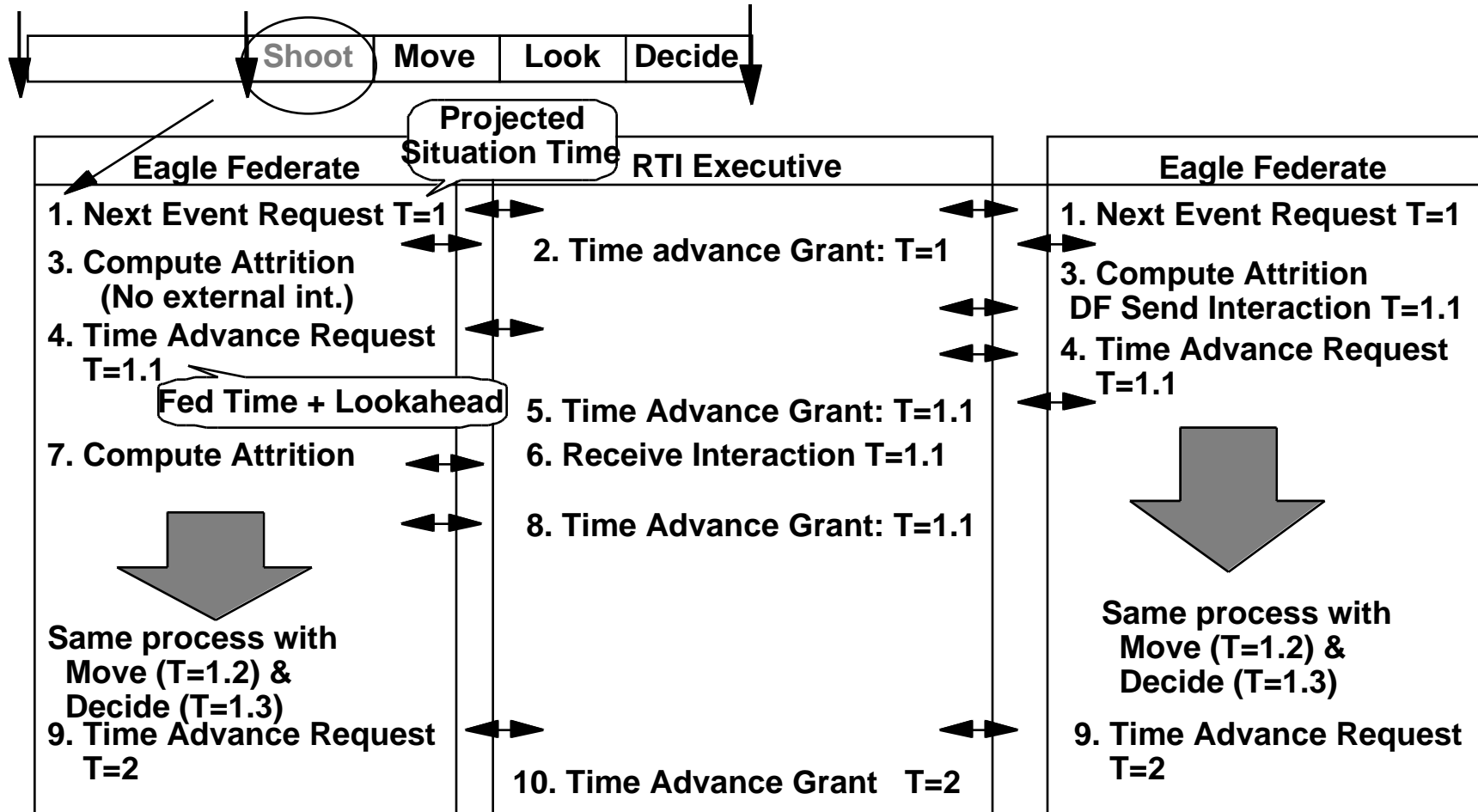


EAGLE Time Management

Time Step Update Process - Projecting Situation for next time Step



Integrated Training Program



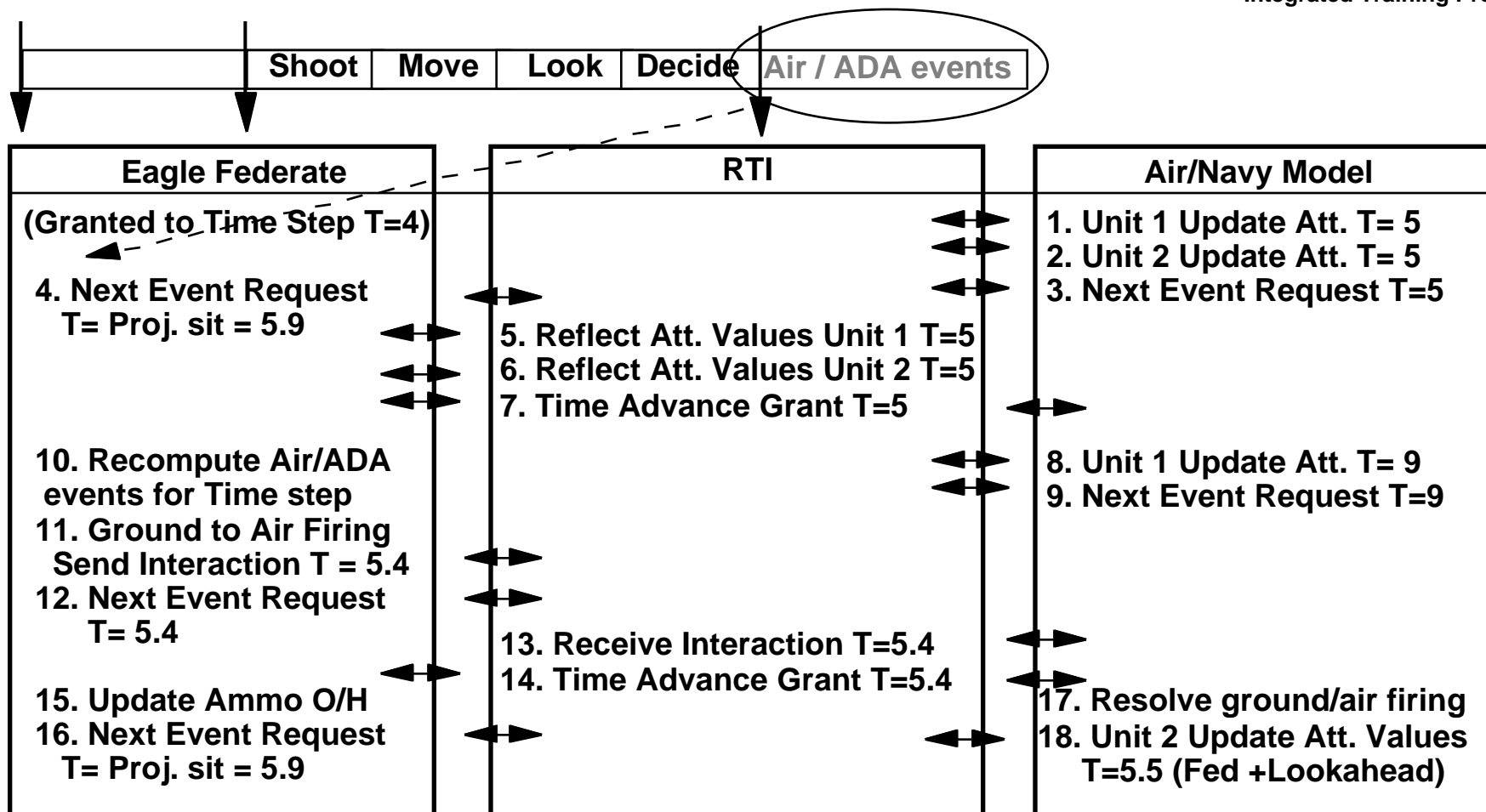


EAGLE Time Management

Event Update Process



Integrated Training Program



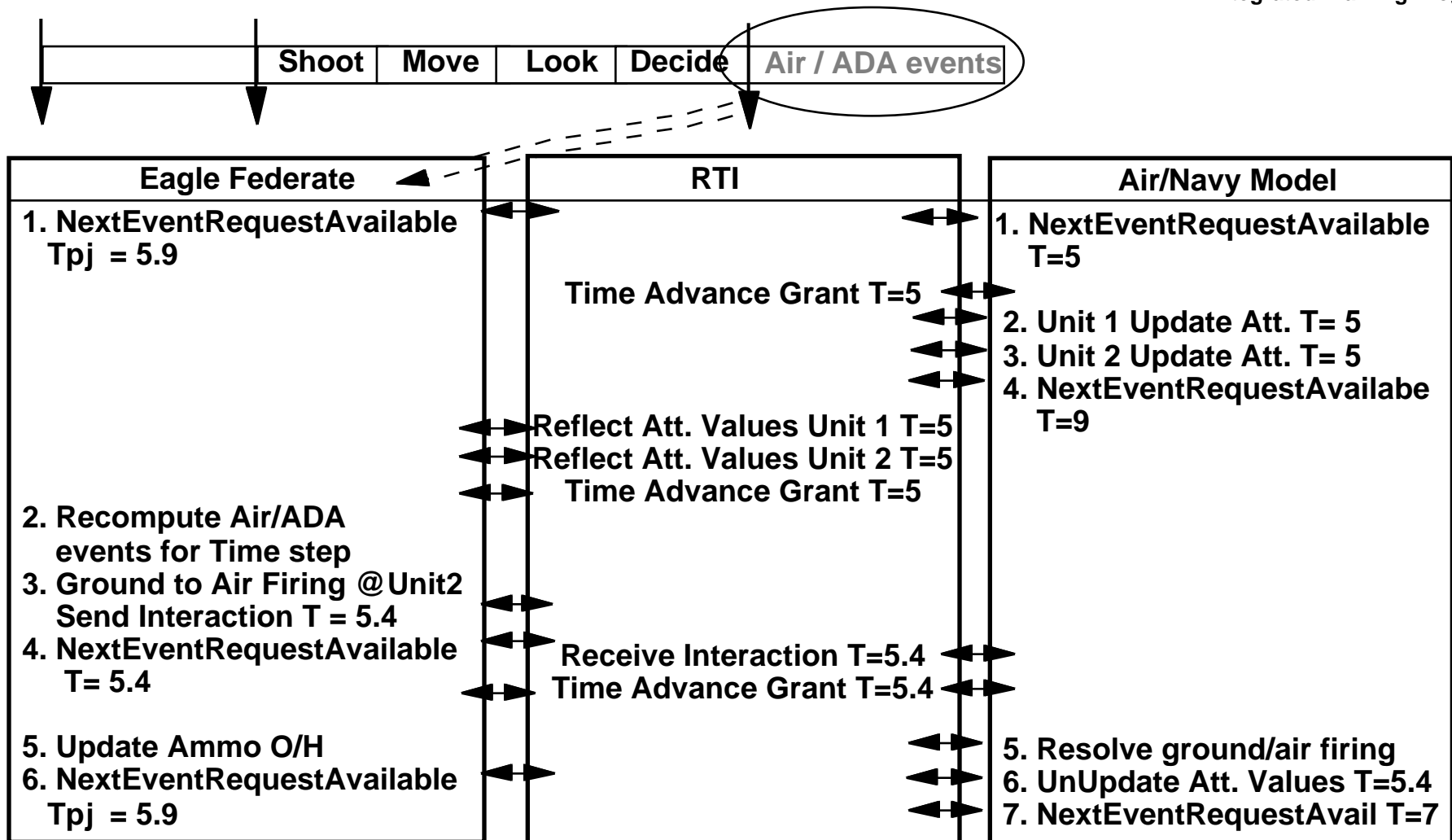


EAGLE Time Management

Event Update Process (Zero Lookahead)



Integrated Training Program





Eagle Modifications

To support the JTFp Event Queue Management



Integrated Training Program

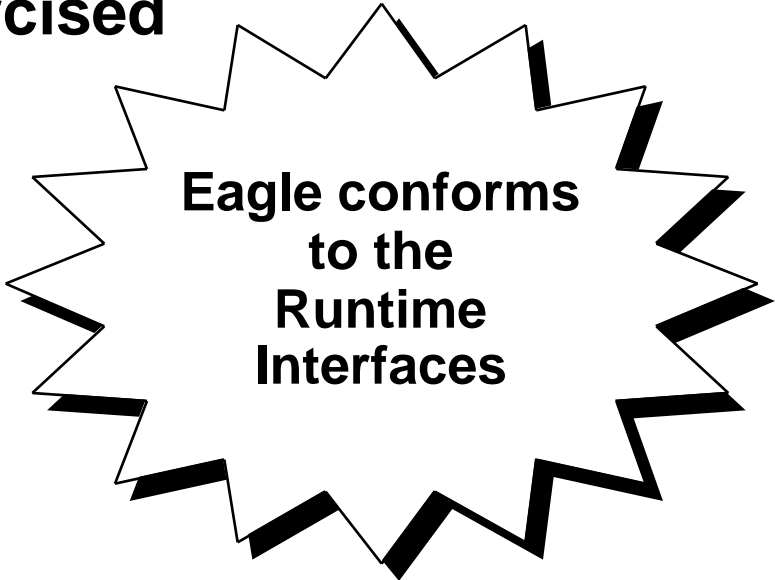
- **Subordinate Eagle's simulation event queue to that of the RTI**
 - **Approval to execute an Eagle event must come from the RTI**
 - **Request may be denied**
- **Ability to respond to new external events from RTI**
 - **Eagle simulation event queue repair**
 - **Updating of aircraft situation within Eagle's timestep**
 - **Reallocation of ADA to respond to aircraft projected flight paths**
- **Maintaining of Federate Time**
 - **Manipulation of time for lookahead requirements**
- **Causality & Consistency was maintained !!!!!**

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**Eagle conforms
to the
Runtime
Interfaces**



RTI

Functional Interfaces Used Distributed & Functional Area



Integrated Training Program

Type	Avail	Used	Type	Avail	Used
Federation Management	17	3	Ownership Management	7	1
Declaration Management	6	4	Object Management	17	10
Time Management	9	4	Data Distribution Management	6	0

Federation Management

CREATE_FEDERATION_EXECUTION
JOIN_FEDERATION_EXECUTION
RESIGN_FEDERATION_EXECUTION

Declaration Management

PUBLISH_OBJECT_CLASS
SUBSCRIBE_OBJECT_CLASS_ATTRIBUTE
PUBLISH_INTERACTION_CLASS
SUBSCRIBE_INTERACTION_CLASS

Time Management

TIME_ADVANCE_REQUEST
NEXT_EVENT_REQUEST
SET_LOOKAHEAD
TIME_ADVANCE_GRANT

Ownership Management

REQUEST_ATTRIBUTE_OWNERSHIP_DIVESTITURE

Object Management

ID_REQUEST
REGISTER_OBJECT
DELETE_OBJECT
UPDATE_ATTRIBUTE_VALUES
SEND_INTERACTION
DISCOVERED_OBJECT
REMOVE_OBJECT
REFLECT_ATTRIBUTE_VALUES
RECEIVE_INTERACTION
PROVIDE_ATTRIBUTE_VALUE_UPDATE

The Above are used &
understood
by Eagle

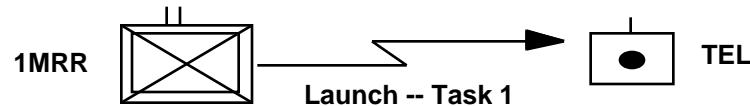


Functional Interfaces

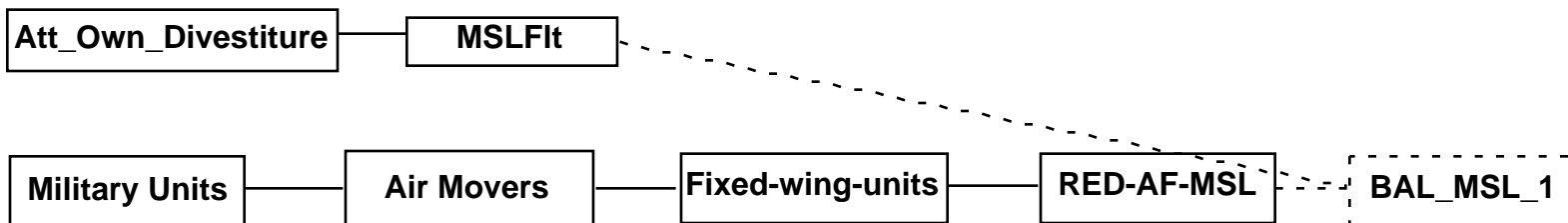
Ownership Management Eagle creates and NASM AP Flies



Integrated Training Program



1. TEL receives msg to Launch Ballistic Missile - Changes to Operational Activity Pre Launch
Create Ballistic Missile - Eagle Class RED-AF-MSL with name "bal_msl_1"
Initialize with Operational Activity SpinUptoLaunch, determine Launch Time
If Func-area-distributed
Id_request, Register_Object, Update_attribute_values
If Not Func-area-distributed place launch event on ASM event queue
If Func-area-distributed
 - A. Place Divest-Msl-flight event on ASM event queue
 - B. **Request_attribute_ownership_divestiture**
To NASM - location & Time of arrival attributes
2. Air Space Manger processes Divest-Msl-flight event
Attach Bal_msl_1 to Class MSLFit. This will cause methods to be inherited by BAL_MSL_1 that will over write normal move & update methods, allowing all movement of the MSL to be caused by updates from the Federation.



TOPICS



Integrated Training Program

- Eagle Design Summary
- Summary of Effort & Design
- Technical Approach
- Class Structures
- Interactions
- Event Synchronization
- RTI Functionality Exercised
- **Testing - Results**
- Summary

A black and white starburst graphic with a jagged, multi-pointed border. Inside the starburst, the text 'Measures of Effectiveness' and 'Speed & Consistency' is written in a bold, sans-serif font.

**Measures of
Effectiveness**

**Speed &
Consistency**



Results - Distributed Eagle

Consistency & Time



Integrated Training Program

Consistency - Simple Test, 2 machines

		Machine 1	Machine 2
Direction	Type	Num	Num
OUT	FED	1	2
	DEC	33	33
	OBJ	355	343
	OBJ OUT	8007	7816
	OWN	0	0
	TIME	723	723
	TOTAL	9119	8917
IN	FED	0	0
	DEC	5	5
	OBJ	7816	8007
	OWN	0	0
	TIME	144	144
	TOTAL	7965	8156

1. No Messages lost.
2. Duplicates
Ver .30 avg: 100
Ver .33 none
3. Consistency
with standalone
??

Time - 2 machine run 100 units/machine

ALSP : 21 to 1

HLA (.33) : 24 to 1 (F.0alpha) : 25 to 1

TOPICS



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- **Summary**

A black and white starburst graphic with a jagged, multi-pointed border. Inside the starburst, the text 'It Works and it can be done!' is written in a bold, black, sans-serif font.

**It Works
and it can be
done!**

Summary



Integrated Training Program

- **Code Changes (< 3.0%)**
 - Basic model is app. 750,000 lines of code
 - Added Translator Interface app. 16,000 lines of Lisp code
 - Added 3,742 lines of C++ interface code
- **Time**
 - Initial design & coding of Distributed Eagle using ALSP = 10 months
 - SOM/FOM development = 1 months
 - Modify the ALSP interface code = 3 months
 - Creation of C++ interface code = 1 month
 - Testing = 1 month
- **Eagle's Design (Architecture) & Object Oriented approach facilitated transition**

WHY DO IT ???



Integrated Training Program

- **Move to Distributed Simulation -**
 - Increase speed & number of units able to play.
- **Ability to share data with other simulations.**
 - Able to use Military Service sponsored simulations that meet their standards of validation.
 - ◊ We get their validated and verified modeling algorithms and data for the representation of their systems.
 - Better representation of Air - completely replaced
 - Better physical models - flying of TBM's
 - New Functionality - Ships
- **Through Eagle/MCSP Interface able to improve (?) the simulation by allowing live players to replace the simulated command entities in Eagle.**